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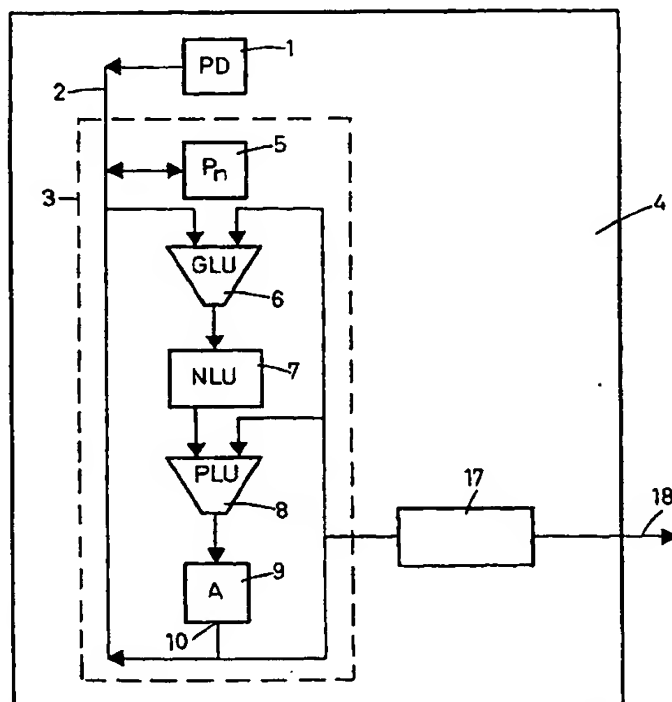
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/SE95/00159</p> <p>(22) International Filing Date: 16 February 1995 (16.02.95)</p> <p>(30) Priority Data: 9400761-4 3 March 1994 (03.03.94) SE</p> <p>(71) Applicant (for all designated States except US): IVP INTEGRATED VISION PRODUCTS AB [SE/SE]; Teknikringen 2C, S-583 30 Linköping (SE).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): FORCHHEIMER, Robert [SE/SE]; Tingsvägen 24A, S-582 49 Linköping (SE). WASELL, Björn [SE/SE]; Löjtnantsgatan 22, S-590 60 Ljungsbro (SE).</p> <p>(74) Agents: WILLQUIST, Bo et al.; Albihn Willquist AB, S:t Larsgatan 23, S-582 24 Linköping (SE).</p>		<p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).</p> <p>Published Without international search report and to be republished upon receipt of that report.</p>

(54) Title: ARRANGEMENT AND METHOD FOR READING IN AND COMPRESSION OF DATA FOR TELEFAX TRANSMISSION

## (57) Abstract

The present invention relates to an arrangement and a method for reading in and compression of data for telefax transmission or document reading. The arrangement comprises photo-diodes (1) arranged on a substrate in matrix form, which photo-diodes, in conjunction with picture-processing and signal-processing circuits linked to the photo-diodes and control logic, are executed in integrated form on one and the same substrate. The aforementioned picture-processing and signal-processing circuits comprise a first logic circuit (6), which is so arranged as to detect picture elements in a signal read in by the photo-diodes, which picture elements satisfy a predetermined digital condition. A second logic circuit (7) is so arranged as to detect the edges of the aforementioned picture elements, and a third logic circuit (8) is so arranged as to eliminate elements detected by preceding circuits from the stored signal. The signal is finally converted in a digital network (17) of a combinative or sequential kind into a compressed form suitable for telefax transmission or document reading.



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Arrangement and method for reading in and compression of data  
for telefax transmission

The present invention relates to an arrangement for reading in and compression of data for telefax transmission or document reading comprising photo-diodes arranged on a substrate in matrix form, which photo-diodes, in conjunction with picture-processing and signal-processing circuits  
5 connected to the photo-diodes, are executed in integrated form on one and the same substrate.

The invention also relates to a method for reading in and compression of data for telefax transmission or document  
10 reading, for which photo-diodes arranged on a substrate in matrix form are used, which photo-diodes, in conjunction with picture-processing and signal-processing circuits connected to the photo-diodes, are executed in integrated form on one and the same substrate.

15 The unidimensional picture representation used in telefax transmission makes it advantageous, when reading a document in a fax, to make use of optical sensors arranged in linear form. These convert the picture signal into an electrical  
20 signal, which is then usually transmitted in serial form to a microprocessor, in which the signal is compressed in such a way that its information content can be transmitted in a less space-consuming and more rapid fashion, for example by means of burst length coding. Although reading can be  
25 executed rapidly with today's fax transmission methods, it is difficult rapidly to convert the information in a document into a form suitable for transmission because the signal is transmitted uncompressed in serial form from the optical sensor to the microprocessor. Serial transmission to the  
30 microprocessor and compression are highly time-consuming operations.

Previously disclosed in EP, A, 0323 183 is an integrated circuit which comprises a number of photo-sensors with

picture-processing and signal-processing circuits arranged on the same substrate. The signal-processing circuits are not, however, arranged to perform compression of the information intended for transmission.

5

Previously disclosed in SE, A, 8301398-7 is an arrangement for an array of photo-diodes arranged in the form of a matrix, which are connected to an picture-processing processor of the kind that permits parallel signal processing. The arrangement is characterized in that it comprises a circuit of a combinative or sequential kind, which is also arranged on the aforementioned substrate, and which is used in order to make a numerical and/or positional determination of picture elements which, via the diode matrix and the picture-processing processor, are found to satisfy one or other predetermined digital condition. This circuit is primarily so arranged as to be used for industrial applications such as quality control and particle counting.

20 The object of the present invention is to present an arrangement for reading in and compression of data for telefax transmission or document reading, which is based on the above-mentioned combination of photo-diodes, a signal-processing processor and a circuit of a sequential or  
25 combinative kind arranged on a substrate, and which solves the above-mentioned problems associated with telefax transmission. This is achieved in that the aforementioned picture-processing and signal-processing circuits comprise a first logic circuit, which is so arranged as to detect  
30 picture elements in a signal read in by the photo-diodes, which picture elements satisfy a predetermined digital condition, a second logic circuit, which is so arranged as to detect the edges of the aforementioned picture elements, a third logic circuit, which is so arranged as to eliminate  
35 elements detected by preceding circuits from the stored signal, and a digital network of a combinative or sequential kind, which is so arranged, with reference to the detected picture elements, as to convert the signal into a compressed

form suitable for telefax transmission or document reading.

According to one particular characteristic of the invention, the aforementioned third logic circuit is so arranged as to  
5 test the connectivity between objects in consecutive lines in the picture.

According to a further particular characteristic of the invention, the aforementioned digital network is so arranged  
10 as to convert the signal read in into burst length coding.

A method in accordance with the invention is characterized in that picture elements in a signal read in by the photo-  
diodes, which picture elements satisfy a predetermined  
15 condition, are detected in a first logic circuit, in that the edges of the aforementioned picture elements are detected in a second logic circuit, in that picture elements detected by the preceding circuits are eliminated from the stored signal in a third logic circuit, and in that the signal read in is  
20 converted in a digital network of a combinative or sequential kind connected to the circuit, with reference to the detected picture elements, into a compressed form suitable for telefax transmission or document reading.

25 According to a particular characteristic of a method in accordance with the invention, the connectivity between objects on consecutive lines in the picture is tested in the aforementioned third logic circuit, after which the connectivity information is converted in the digital network  
30 into a form suitable for telefax transmission.

The invention is described below in greater detail with reference to the accompanying drawing, in which Fig. 1 is a simplified block diagram for an arrangement in accordance  
35 with the invention constructed on a single substrate. Advantageous embodiments of units contained in the arrangement are shown in Fig. 2 and Fig. 3, and Fig. 4a - Fig. 4d show signals stored in the register at different

times.

Fig. 1 shows a diode matrix 1 comprising a number of photo-diodes (PD = photo-diode) which is connected via a data bus 2 to an picture-processing processor 3. The signals detected by the photo-diodes are converted into digital form before they are processed in the picture-processing processor, which is linked to a digital signal-processing circuit 17. The photo-diode matrix, the picture-processing processor 3 and the signal-processing circuit 17 are arranged on a common substrate. Both the picture-processing processor 3 and the signal-processing circuit 17 are capable of performing parallel operations that are executed at clock cycle intervals.

The picture-processing processor comprises an array of picture registers 3 ( $P_n$  = picture register) linked to first logic circuits 6 (GLU = global logical unit), which facilitates the calculation of certain global picture characteristics, and an accumulator register 9 (A = accumulator register). The array of picture registers 5 and the accumulator register 9 are used for the intermediate storage of pictures. The GLU unit 6 is so arranged in a previously disclosed fashion as to identify from a picture A supplied from the accumulator register 9 objects that are indicated by a picture coming from the data bus, and as to detect the edges of the aforementioned object in the picture, which originates either from the diode matrix 1 or the array of picture registers 5. An advantageous embodiment of the GLU unit is shown in Fig. 3.

The picture processing circuits also contain other logic circuits 7 (NLU = neighbourhood logical unit) and third logic circuits 8 (PLU = point logical unit). The NLU circuits 7 are so arranged as to identify the edges of the objects and to invert a picture coming from the GLU unit 6. Each local area in the picture is compared with a template, and when the picture coincides with the template, this is marked with a

logical zero or one. The PLU circuits 8 are so arranged as to execute point logical operations of the type AND, OR and EXCLUSIVE OR between two pictures from the accumulator register and from the NLU circuits. For example, EXCLUSIVE OR operations are used for identifying differences between the  
5      aforementioned pictures. The information obtained in this way is transmitted to a digital network 17, in which the information is encoded in a form suitable for transmission.

10     The digital network 17, which has parallel input and serial output, is connected to the processor 3. This network is so arranged as to determine the number of picture points which satisfy a digital condition. One possible embodiment of this network is shown in Fig. 2. In the case of the customary  
15     burst length coding for the telefax transmission, this means that the output signal will contain numerical values which correspond to the number of consecutive ones or the number of consecutive zeros. A digital number which represents the information read in is thus obtained at the output 18 from  
20     the network. This result is read out in serial form to further signal-processing circuits, such as Huffman encoders, or directly to an appropriate communication circuit. Because all information processing is done in parallel, a compressed output signal can be obtained on the output 18 from the  
25     network very shortly after reading in the picture signal.

The reading-in and signal processing of a unidimensional, binary picture signal, a line in a black-and-white telefax document, is explained in simplified terms below with  
30     reference to Figs. 4a-4d.

Figure 4a shows a first line signal read in by the photo-diode matrix, which signal is digitalized and stored in a picture register 5. In a first operation in the circuit, the  
35     GLU unit 6 and the NLU unit 7 are used in combination to detect the edge of the first object in the picture, that is the first area with one or more consecutive ones (black field). The result, which can be appreciated from Fig. 4b, is



stored in the accumulator register 9 while the digital network 17 determines the number of consecutive zeros as far as that edge identification.

5 The signal stored in the A-register 9 is then able, together with the signal stored in the picture register 5, to act as the input signal for the GLU circuit 6. This circuit has the capacity during a single clock cycle interval to detect the whole of the first object, see Fig. 4c, irrespective of its  
10 length. The length of the detected object is then determined in the digital network 17, the output signal from which is now a number which represents the length of the object.

The new result picture, see Fig. 4c, is also transmitted to  
15 the PLU circuits, which are able to perform logical EXCLUSIVE OR operations between two pictures. The result picture is compared here with the originally stored picture, which results in a new picture being obtained, in which the first object can no longer be seen, see Fig. 4d. This new picture  
20 is stored in a picture register 5, after which the operations in accordance with the above are repeated on the new picture.

Obtained at the output 18 from the network 17 are numbers which correspond to the number of consecutive zeros and ones  
25 in a picture, i.e. in all essential respects the code which is used at present for the telefax transmission. The picture information is thus compressed to a significant degree in the circuit indicated above.

30 Once compression of the first line is complete, a new line picture can be read in, after which the operations in accordance with the above are repeated on it.

The circuits described above are also well suited to other  
35 types of compression coding. The circuits can be used, for example, to make comparisons at any time between consecutive pictures, so that additional signal information is transmitted only for those areas in which the signals differ.

It is possible in this way to take advantage of the fact that two consecutive lines in a telefax transmission often exhibit considerable similarities.

- 5 The invention can naturally also be used when the input signals are not binary but, for example, contain both grey scale and colour, as will be appreciated by a person skilled in the art.
- 10 It is obvious that the invention must not be regarded as being restricted to the embodiment shown in the drawing or the example described above, and that it may be varied in many ways within the scope of the idea of invention; for instance, it may be used with a type of coding other than
- 15 burst length coding.

It is also obvious that the invention can be used in other document reading contexts, for example in so-called scanners.

Patent Claims

1. Arrangement for reading in and compression of data for  
5 telefax transmission or document reading comprising  
photo-diodes (1) arranged on a substrate in matrix  
form, which photo-diodes, in conjunction with picture-  
processing and signal-processing circuits (3, 17)  
connected to the photo-diodes and control logic, are  
executed in integrated form on one and the same  
10 substrate, *characterized* in that the aforementioned  
picture-processing and signal-processing circuits (3,  
17) comprise a first logic circuit (6), which is so  
arranged as to detect picture elements in a signal read  
in by the photo-diodes, which picture elements satisfy  
15 a predetermined digital condition, a second logic  
circuit (7), which is so arranged as to detect the  
edges of the aforementioned picture elements, a third  
logic circuit (8), which is so arranged as to eliminate  
elements detected by preceding circuits from the stored  
20 signal, and a digital network (17) of a combinative or  
sequential kind, which is so arranged, with reference  
to the detected picture elements, as to convert the  
signal into a compressed form suitable for telefax  
transmission or document reading.  
25
2. Arrangement in accordance with Patent Claim 1,  
*characterized* in that the aforementioned third logic  
circuit (8) is so arranged as to test the connectivity  
between objects in consecutive lines in the picture.  
30
3. Arrangement in accordance with one or other of the  
preceding Patent Claims, *characterized* in that the  
aforementioned digital network (17) is so arranged as  
to convert the signal read in into burst length coding.  
35
4. Method for reading in and compression of data for  
telefax transmission or document reading, whereby  
photo-diodes (1) arranged in matrix form are used,

which photo-diodes, in conjunction with picture-processing and signal-processing circuits (3, 17) connected to the photo-diodes and control logic, are integrated on one and the same substrate, *characterized* in that picture elements in a signal read in by the photo-diodes, which satisfy a predetermined digital condition, are detected in a first logic circuit (6), in that the edges of the aforementioned picture elements are detected in a second logic circuit (7), in that picture elements detected by the preceding circuits (6, 7) are eliminated from the stored signal in a third logic circuit (8), and in that the signal read in is converted in a digital network (17) of a combinative or sequential kind connected to the circuit, with reference to the detected picture elements, into a compressed form suitable for telefax transmission or document reading.

5. Method in accordance with Patent Claim 4, *characterized* in that the connectivity between objects on consecutive lines in the picture is tested in the aforementioned third logic circuit, and that the connectivity information is converted in the digital network into a form suitable for telefax transmission.

25

FIG. 1

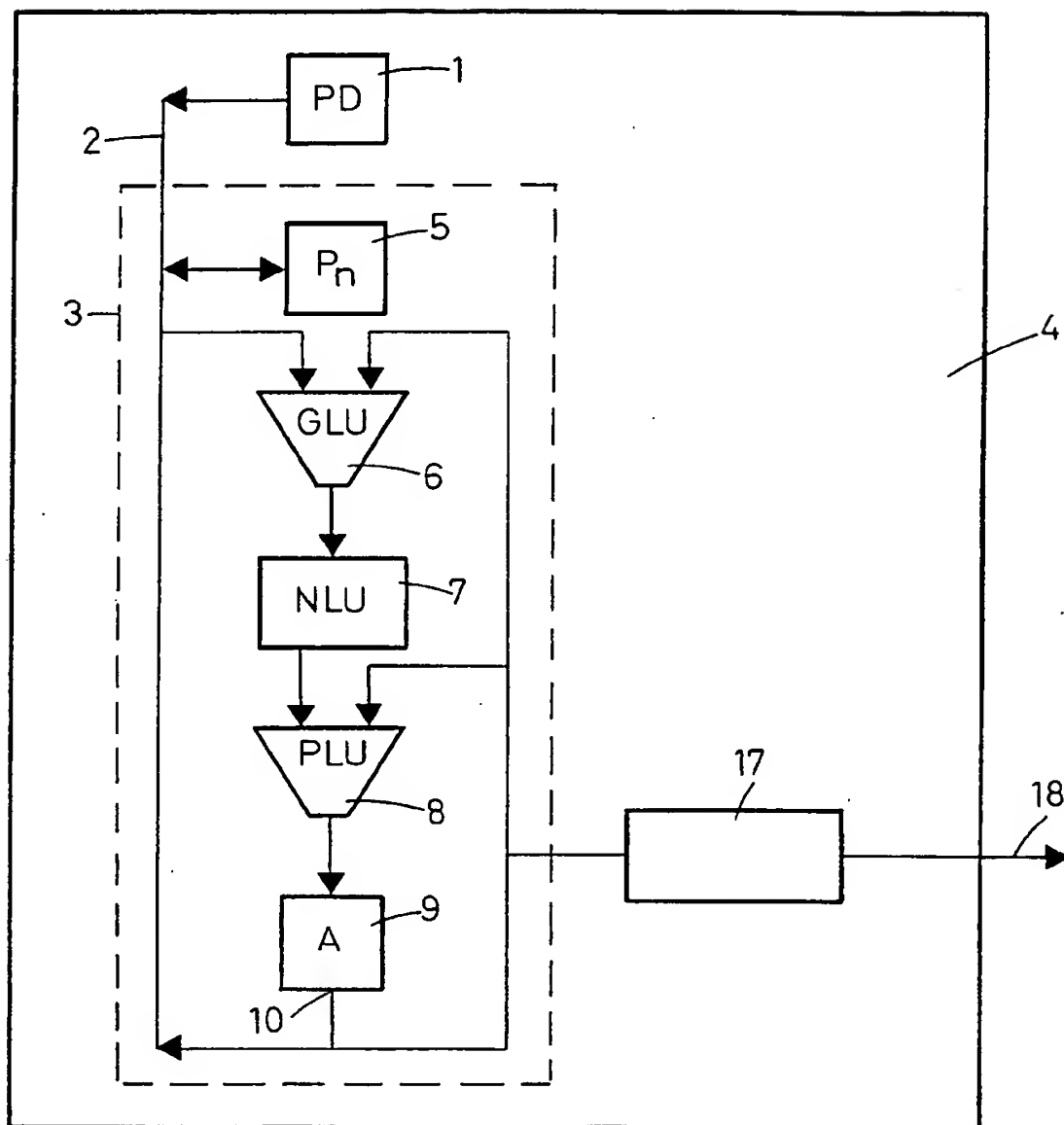


FIG. 2

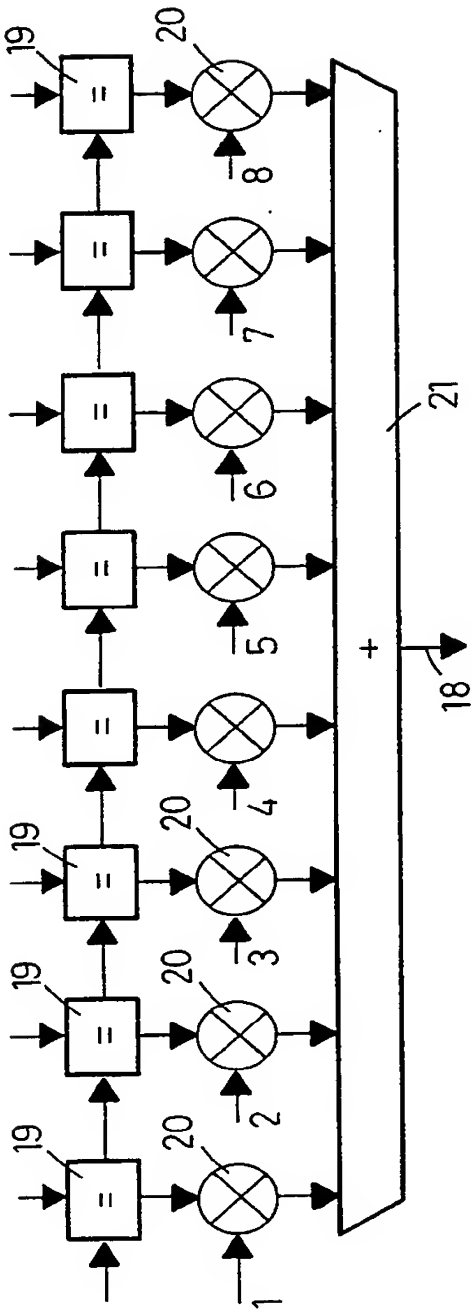


FIG. 3

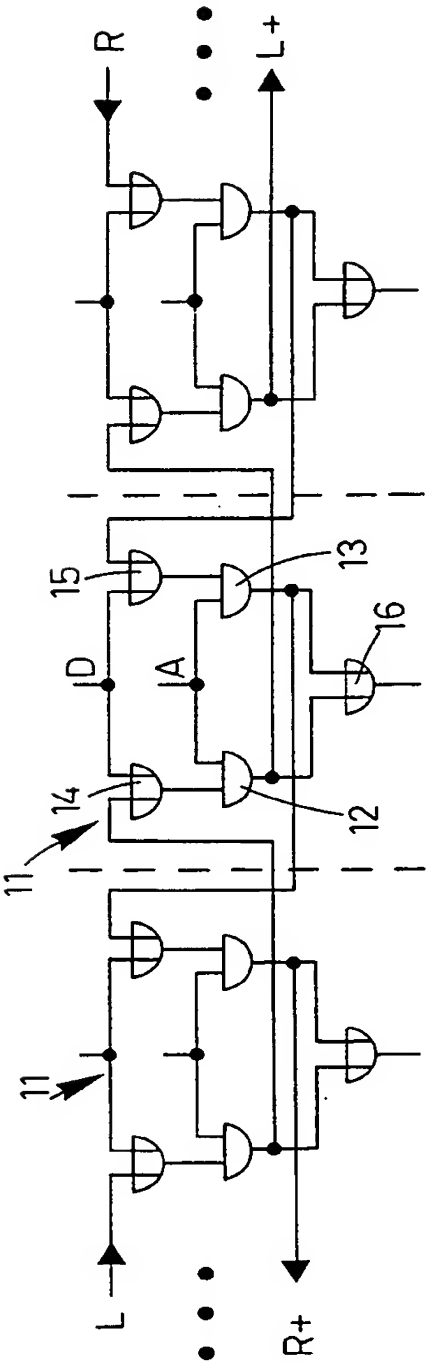


FIG. 4a



FIG. 4b



FIG. 4c

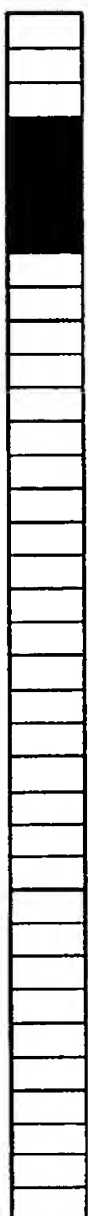
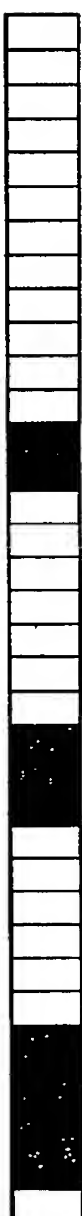


FIG. 4d



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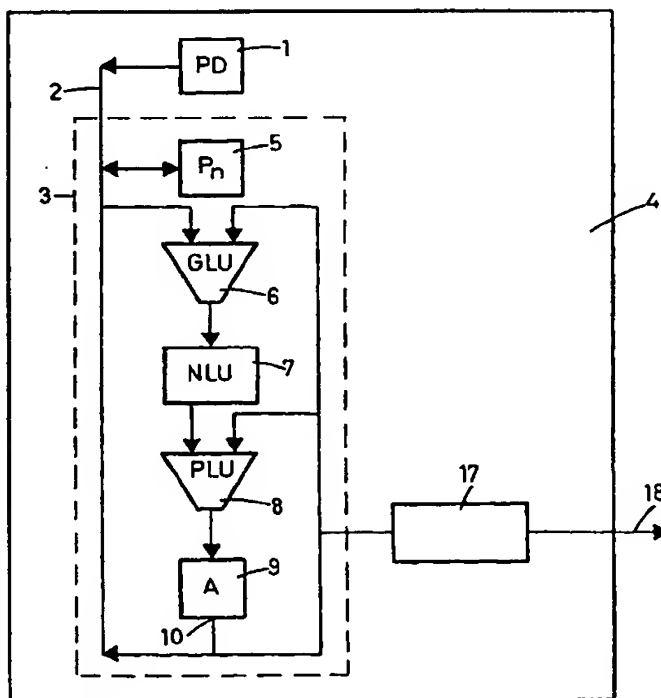
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(22) International Filing Date: 16 February 1995 (16.02.95)			
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(71) Applicant (for all designated States except US): IVP INTEGRATED VISION PRODUCTS AB [SE/SE]; Teknikringen 2C, S-583 30 Linköping (SE).		Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	
(72) Inventors; and (75) Inventors/Applicants (for US only): FORCHHEIMER, Robert [SE/SE]; Tingsvägen 24A, S-582 49 Linköping (SE). WASELL, Björn [SE/SE]; Löjtnantsgatan 22, S-590 60 Ljungsböro (SE).		(88) Date of publication of the international search report: 5 October 1995 (05.10.95)	
(74) Agents: WILLQUIST, Bo et al.; Albihn Willquist AB, S:t Larsgatan 23, S-582 24 Linköping (SE).			

(54) Title: ARRANGEMENT AND METHOD FOR READING IN AND COMPRESSION OF DATA FOR TELEFAX TRANSMISSION

## (57) Abstract

The present invention relates to an arrangement and a method for reading in and compression of data for telefax transmission or document reading. The arrangement comprises photo-diodes (1) arranged on a substrate in matrix form, which photo-diodes, in conjunction with picture-processing and signal-processing circuits linked to the photo-diodes and control logic, are executed in integrated form on one and the same substrate. The aforementioned picture-processing and signal-processing circuits comprise a first logic circuit (6), which is so arranged as to detect picture elements in a signal read in by the photo-diodes, which picture elements satisfy a predetermined digital condition. A second logic circuit (7) is so arranged as to detect the edges of the aforementioned picture elements, and a third logic circuit (8) is so arranged as to eliminate elements detected by preceding circuits from the stored signal. The signal is finally converted in a digital network (17) of a combinative or sequential kind into a compressed form suitable for telefax transmission or document reading.





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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/SE 95/00159

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04N 1/411

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Patent Abstracts of Japan, Vol 13, No 353, P-913, abstract of JP, A, 1-112469 (FUJITSU LTD), 1 May 1989 (01.05.89)	1,4
A	--	2,5
Y	WO 8403810 A1 (WILLQUIST, BO), 27 Sept 1984 (27.09.84), abstract	1,4
A	--	3
	US 4499499 A (NORMAN F. BRICKMAN ET AL), 12 February 1985 (12.02.85), column 2, line 10 - line 29, abstract	
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Bengt Jonsson  
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5014334 A (TAKAHIRO FUKUHARA ET AL), 7 May 1991 (07.05.91), column 1, line 53 - line 66; column 3, line 41 - line 52  -----	1,4

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Information on patent family members

31/07/95

International application No.  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A1- 8403810	27/09/84	AU-B- 565350 AU-A- 2656684 CA-A- 1210852 DE-A- 3472051 EP-A,B- 0168399 JP-B- 6095012 JP-T- 60500887 SE-B,C- 431145 US-A- 4684991	10/09/87 09/10/84 02/09/86 14/07/88 22/01/86 24/11/94 06/06/85 16/01/84 04/08/87
US-A- 4499499	12/02/85	EP-A,A,A 0112991 JP-C- 1352923 JP-A- 59125164 JP-B- 61018381	11/07/84 11/12/86 19/07/84 12/05/86
US-A- 5014334	07/05/91	JP-A- 2296477	07/12/90